Service Reference Book

MASTER TECHNICIANS SERVICE CONFERENCE

SESSION NO. 165

MANUAL TRANSMISSION SERVICE

PREPARED BY CHRYSLER CORPORATION

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A word to the wise...

Experience has proved that many manual transmission service complaints can be cleared up without removing or disassembling the transmission, itself. In most cases, a thorough cleaning and lubrication plus some fairly simple – but very important – adjustments will correct the complaint.

Occasionally, the trouble may be traced to areas other than the transmission. Once in a while, the fault may even lie in the owner's poor driving habits. Then the only "fix" is a tactful suggestion that the owner use his transmission properly to get the most out of it!

Obviously, there are also times when a transmission must be removed from the car, disassembled and repaired. But whether the problem is one that can be solved by a few simple adjustments, or one that requires a complete transmission overhaul, you'll find this reference book packed with pertinent information. Use these tips to supplement the data and procedures in your current Service Manual and Service Bulletins.

Legitimate service complaints on manual transmissions fall mainly into two broad categories: "noise" and "hard shifting". The diagnosis and correction of these types of complaints, as presented in this reference book, will touch on virtually all the problems normally encountered on these units.

TABLE OF CONTENTS

	Page
DIAGNOSIS OF TRANSMISSION NOISE	1
DIAGNOSIS OF HARD SHIFTING	2
COLUMN-MOUNTED GEARSHIFT LINKAGE ADJUSTMENT	3
FLOOR-MOUNTED GEARSHIFT LINKAGE ADJUSTMENT	8
CLUTCH OPERATION	9
OVERHAUL TIPS	10

DIAGNOSIS OF TRANSMISSION NOISE

The most common manual transmission complaint and at times the most elusive to track down, comes under the general heading of "noise in the transmission". More specific information is needed to help you pinpoint the trouble. What kind of a noise is it? When does it occur? How long has it been apparent? What are the owner's driving habits? You'll need the answers to these questions — and others as well—to help you isolate the cause of the complaint. In some cases, you may even find that the so-called transmission noise originates elsewhere in the drive train. Here are some general rules-of-thumb to guide you in diagnosing these problems.

NOISES WITH CAR IN MOTION

A chattering gear noise when the car is coasting in gear with the clutch disengaged is not abnormal and is no cause for concern. It does, however, indicate a poor driving habit on the owner's part—disengaging the clutch too soon and not using the engine to slow the car when coming to a stop. This chattering noise, sometimes also described as a rattle or flutter, may fade away after a while in a new car as the gears wear in. In warmer climates, this noise may be reduced by using SAE 90 gear lubricant. In cooler climates, however, you might create a hard shifting complaint by using this heavier lubricant.

Noise from the transmission just before stopping might be caused by a parking brake that is dragging or has an out-of-round drum. In any event, it's a good idea to be sure the parking brake is adjusted correctly and operating properly when tracking down most transmission complaints.

A harsh metallic rattle upon acceleration in high gear within the 20- to 30-MPH range may originate not from the transmission, but from the clutch, if the clutch disc damper is not functioning properly. This noise may also appear upon deceleration, between 50- and 35-MPH. It will sometimes be evident at lower speeds in second and low gears, too.

A rattle in the gearshift linkage of earlier '61 cars may be eliminated by installing the current anti-rattle type washers at the control rod swivel.

NOISES WITH CAR AT REST

A rattling noise in neutral with the clutch engaged can be caused by a worn or misaligned drive pinion bearing. When installing the pinion bearing retainer, follow the instructions in your service manual for selectively fitting a gasket of the right thickness to eliminate all bearing end play. You'll find more on this subject in the "OVERHAUL TIPS" section of this reference book.

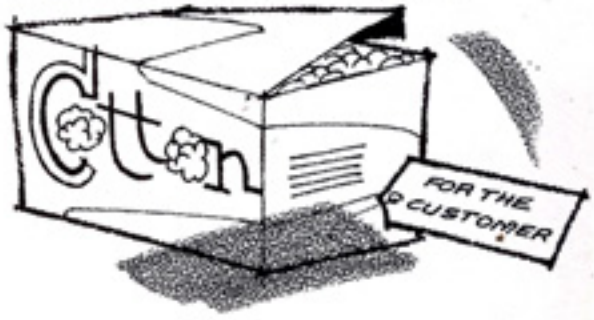
A high-pitched noise in neutral with the clutch disengaged usually indicates a faulty clutch release bearing.

A squealing noise with the transmission in gear and the clutch pedal partially depressed indicates a tight or dry drive pinion pilot bushing in the end of the crankshaft. This noise may be particularly evident with a cold engine, and with the transmission in low gear or second gear. Check the clutch housing bore and face runout, as improper transmission alignment might be putting an excess load on the pilot bushing.

MISCELLANEOUS NOISES

Clashing gears, primarily a hard shifting problem, is a complaint covered in the following section under the heading, "DIAGNOSIS OF HARD SHIFTING".

Other gear noises may require removing and partially disassembling the transmission to inspect the gears for chipped or damaged teeth and loose spline fits. Also check for excessive end play clearances, particularly at the synchronizer and second-speed gear.



DIAGNOSIS OF HARD SHIFTING

The other category into which manual transmission service complaints frequently fall is "hard shifting". The gearshift linkage, the clutch, or the transmission itself may be at the bottom of this problem. In some cases, even the transmission lubricant may have an effect. In searching for the source of trouble, it's usually best to begin with the easiest, most accessible, and most probable things first. With that in mind, the following steps should serve as an effective guide in isolating and correcting "hard shifting" complaints.

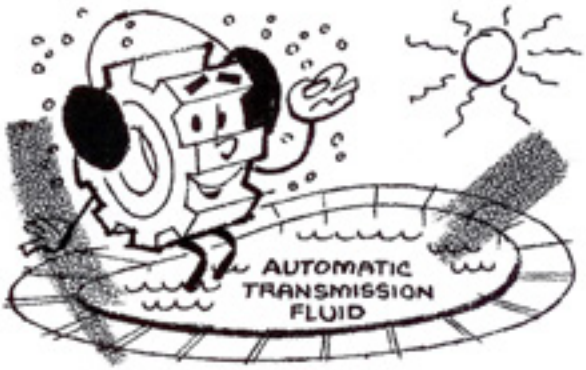
GEAR LUBRICANT

Beginning early in 1961, all Chrysler Corporation cars made in the United States with manual transmissions were serviced at the factory with Automatic Transmission Fluid, Type "A", Suffix "A", instead of the SAE 80 Multi-Purpose Gear Lubricant previously used. Manual transmissions in all 1961 Canadian models were also filled with this automatic transmission fluid. Initial shift effort in cold weather has been significantly reduced with this lubricant, and there are reliable indications that the service life of seals and gaskets has been prolonged, too.

The original factory fill of automatic transmission fluid is colored red, but only for identification. So don't worry about mixing lubricants. Your standard MoPar or Chryco Automatic Transmission Fluid, Type "A", Suffix "A", is compatible with this fluid, as is SAE 80 or SAE 90 Multi-Purpose Gear Lubricant. Except in a few scattered instances where the greater sound-deadening qualities of SAE 90 Gear Lubricant are desirable, it is recommended as a general rule that you do use the automatic transmission fluid. It will pay off in customer satisfaction in the long run.

If the problem is a hard shifting complaint in cold weather—10 degrees above zero, or lower—which seems to clear up after the transmission has been shifted through its gears once, the chances are that a switch to automatic transmission fluid is all that's needed. This is a more satisfactory method than the common practice in colder climates of replacing a pint of lubricant in the transmission with kerosene to reduce shift effort in the winter.

It's less expensive in the course of time, too, since the kerosene mixture has to be replaced with undiluted lubricant in the spring. This must be done to prevent transmission damage because of too low a viscosity in the lubricant. The automatic transmission fluid, on the other hand, is an all-year-round lubricant, good for winter and summer as well.



LINKAGE LUBRICATION

On cars with column-mounted gearshifts, lubricate the fitting for the shift lever hubs at the lower end of the shift tube with regular chassis lubricant. If you find a build-up of oil and dirt, which creates a binding condition in the control rod swivels, it's a good idea to clean them by squirting some MoPar or Chryco manifold heat control solvent on them.

On cars with floor-mounted gearshifts, raise the boot up from the floor pan and lubricate the pivot points and yoke selector mechanism of the linkage with engine oil.

SHIFT LINKAGE AND CLUTCH

Many hard-shifting complaints can be caused by the gearshift linkage being out of adjustment. If this condition is allowed to continue, chipped and broken gears as well as popping out of gear could result. Also be sure the clutch pedal free play is correct, as this can have considerable effect on gearshift quality.

COLUMN-MOUNTED GEARSHIFT LINKAGE ADJUSTMENT

In 1961 Chrysler Corporation cars, two types of column-mounted gearshift linkages are used: a standard linkage and a heavy-duty linkage. The heavy-duty linkage can be identified by an interlock pin attached to the lower end of the shift tube. When a shift is made to second or high, this pin is moved through a hole in the shift lever bracket to engage a matching hole in the low-reverse shift lever. This serves to lock the low-reverse shift lever positively in neutral. The standard linkage doesn't have this interlock pin.

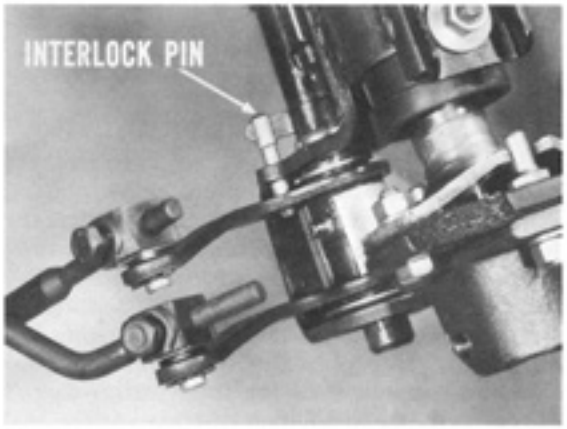


Fig. 1—Heavy-duty linkage

Follow the same order of adjustment with either type of column-mounted linkage. First, inspect the shift lever hub area. Then check and, if necessary, adjust the shift lever bracket, the low-reverse control rod swivel and the second-high control rod swivel, in that order. Complete the adjustment by making some final checks to be sure that the settings will be maintained and the linkage isn't binding.

SHIFT LEVER HUBS INSPECTION

Remove the lubrication fitting at the hub between the two shift levers at the lower end of the steering column. Rotate the cylindrical crossover pin retainer until its open section is up, exposing the crossover pin and the slots in the shift lever hubs. Examine the crossover pin slots in both hubs. Excessive wear in either slot will make it extremely difficult, if not impossible, to properly adjust the linkage. Inspect the hubs for other signs of wear and damage. Also, be sure the two hubs are held together firmly by the spring washer between the bracket and the front hub.

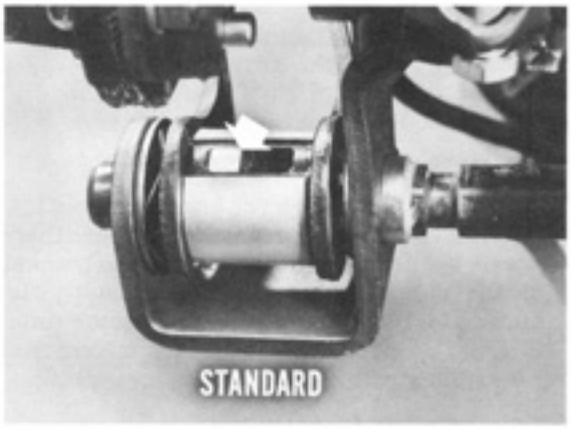


Fig. 2—Crossover pin, standard linkage

The standard linkage has a crossover pin with a square head. The flat sides of this pin insure that the shift lever hubs will not move while the pin is passing through the slots from one hub to the other during crossover from low or reverse to second or high.

The heavy-duty linkage has a crossover pin with a round head. In this linkage, the inter-

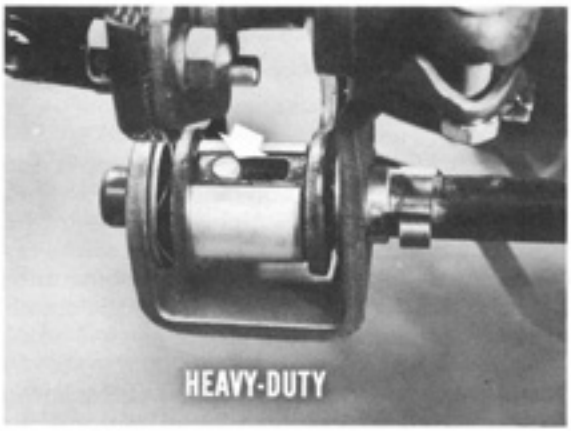


Fig. 3—Crossover pin—heavy-duty linkage

lock provides protection against movement of the hubs during crossover, so the square-headed pin is not required.

Never install the wrong crossover pin with either linkage. A round-headed pin could cause the standard linkage to jam up during quick gearshifting, while a square-headed pin would make it difficult to obtain a smooth crossover in the heavy-duty linkage.

When you're satisfied that the correct crossover pin is installed, and that everything else is okay in this area, turn the crossover pin retainer back to its original position and install the lubrication fitting.

SHIFT LEVER BRACKET ADJUSTMENTS

In the area of the shift lever bracket, two additional items should be inspected. Be sure there is about 5/8-inch clearance between this bracket and the clutch torque shaft arm, with the clutch pedal fully depressed. At the same time, see if the steering column jacket is centered around the steering tube.

Fig. 4—Shift lever bracket clearance

If either condition is not correct, loosen the lower column clamp bolt and the four stud nuts which attach the support bracket to the clamp and the firewall. Turn the clamp as necessary to establish the 5/8-inch clearance between the shift lever bracket and the clutch torque shaft arm.

Hold the jacket centered around the steering tube while tightening the clamp bolt and the four stud nuts. Tighten the clamp bolt to 200 inch-pounds and no more, or the clamp might take a "set" and make future adjustment difficult. Tighten the four stud nuts to 85 inch-pounds.

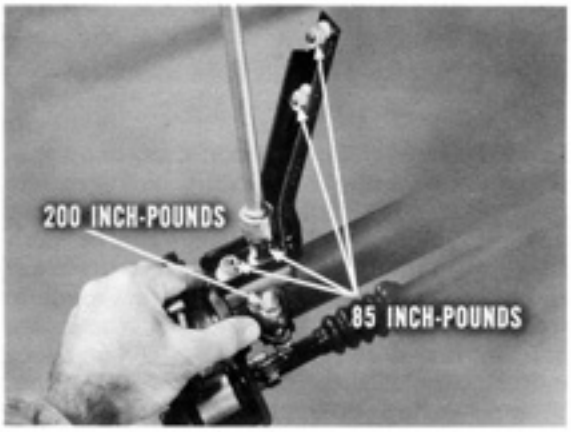


Fig. 5—Steering column jacket centered

CROSSOVER PIN TRAVEL

Crossover pin travel must be adjusted so there is no possibility of incomplete crossover. To test crossover pin travel, slide into the driver's seat and pull the gearshift lever into the low-gear position. Wiggle the lever up and down—parallel to the steering column—and note the free play. Repeat this test in second gear. The amount of free play in both lever positions should be equal. Feel for this gently—there's only about 1/8- to 1/4-inch of travel at the end of the gearshift lever, normally.

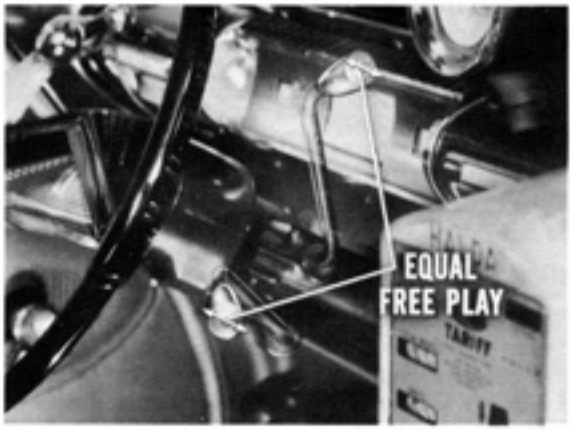


Fig. 6—Test crossover pin travel

Hard shifting may result if the free play in both positions isn't equal. To correct this con-

dition, slightly loosen the lower column clamp bolt and the two stud nuts which hold the column clamp to the support bracket. Then, using a soft plastic-faced hammer, tap the clamp up or down the column. *Up,* if there is inadequate free play in second gear; *down,* if there is too little free play in low. And take it easy with the hammer.

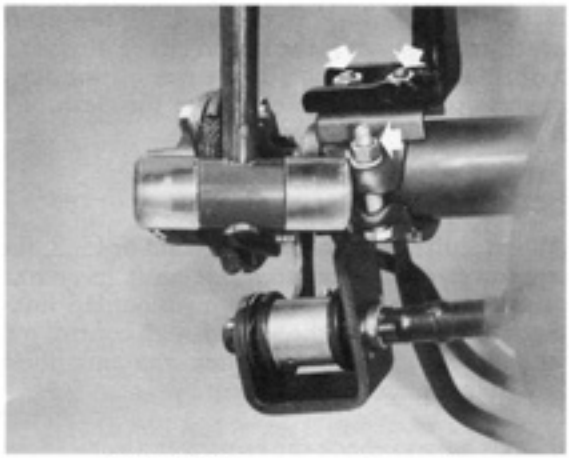


Fig. 7—Adjust crossover pin travel

Remember, you probably won't need to move the clamp more than a few thousandths of an inch to equalize the free play. When it's set, tighten the clamp bolt and stud nuts to the torque values specified earlier.

LOW-REVERSE SWIVEL ADJUSTMENT—STANDARD LINKAGE

On the column-mounted standard gearshift linkage, the setting of the swivel on the low-reverse control rod should be adjusted to establish the neutral position, and consequently, the location of the four gear positions of the driver's gearshift lever. Normally, this linkage should be adjusted so that the knob end of the gearshift lever is just about horizontal in the neutral position. This position can be changed at your discretion, however, to give your customer more kneeroom in high gear or greater clearance from the heater pushbuttons in second.

If adjustment is required, decide how much the gearshift lever should be moved, and in which direction. Then, with the transmission in neutral, loosen the swivel on the low-reverse control rod. Have someone pull the gearshift

Fig. 8—Adjust gearshift lever position

lever up into the low and reverse side and hold it steady in the desired neutral position. Gently move the low-reverse control rod back and forth just enough to be sure the neutral detent in the transmission is fully engaged, then tighten the swivel adjusting locknuts or clamp screw. Changing this adjustment will affect the "feel" of the crossover, so be sure to make the adjustment described under the heading "SECOND-HIGH SWIVEL ADJUSTMENT" after readjusting the low-reverse control rod swivel.

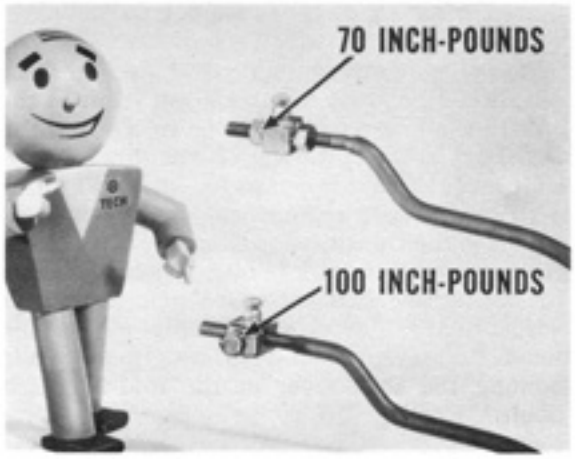


Fig. 9—Swivel types and torques

Some swivels are held to the control rods by a clamp and clamp screw. Others use two swivel adjusting locknuts. Tighten the clamp screws to 100 inch-pounds of torque; tighten the adjusting locknuts to 70 inch-pounds.

LOW-REVERSE SWIVEL ADJUSTMENT—HEAVY-DUTY LINKAGE

In the heavy-duty linkage, the neutral position of the gearshift lever is fixed positively by the interlock pin, and can't be changed.

However, it's absolutely essential that the low-reverse control rod swivel be set so that the hole in the low-reverse shift lever is centered around the interlock pin when this lever is in the neutral position. Otherwise, hard shifting and clashing gears may result. Here's how to test and adjust the setting of this swivel.

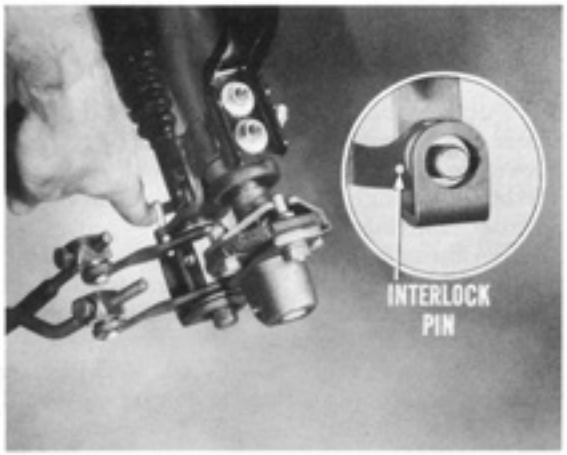


Fig. 10—Center the interlock pin

With the transmission in neutral, the interlock pin should be at its mid-backlash point in the hole in the low-reverse shift lever. To find the mid-backlash point, wiggle the low-reverse shift lever up and down as far as it will move with the interlock pin engaged. The neutral detent in the transmission should hold the low-reverse shift lever at a point precisely halfway between these two extremes of its travel. If adjustment is necessary, simply loosen the swivel on the control rod and retighten it while holding the shift lever at the mid-backlash point.

LOW-REVERSE SWIVEL ADJUSTMENT TEST

It's a good idea to check this adjustment on the heavy-duty linkage before proceeding with the next step. Apply the parking brake fully and idle the engine with the gearshift lever in neutral and the interlock pin engaged in the low-reverse shift lever.

Take hold of either the low-reverse control rod which leads to the transmission or the end of the low-reverse shift lever, and firmly move it back and forth to both extremes of the backlash travel permitted by the interlock pin. In other words, try to shift the transmission into low and reverse by moving the control rod while the interlock is engaged. If the gears clash when moving the rod in either direction, adjust the position of the swivel on the low-reverse control rod to eliminate the clash.

SECOND-HIGH SWIVEL ADJUSTMENT—STANDARD AND HEAVY-DUTY

When shifting from low to second or high, the crossover pin slides from one shift lever hub into the other. On all column-mounted linkages, the swivel on the second-high control rod should be adjusted to obtain the smoothest possible crossover movement.

Here's how to check the crossover "feel". Move the gearshift lever up and down through the crossover several times while holding a slight downward pressure on the gearshift lever. This will hold the crossover pin against the right-hand edge of the slots in the two shift lever hubs. In this way, you'll be more able to feel any misalignment of this edge of the two slots. Repeat this with slight upward pressure on the lever, to press the pin against the left-hand edge of the slots in the hubs.

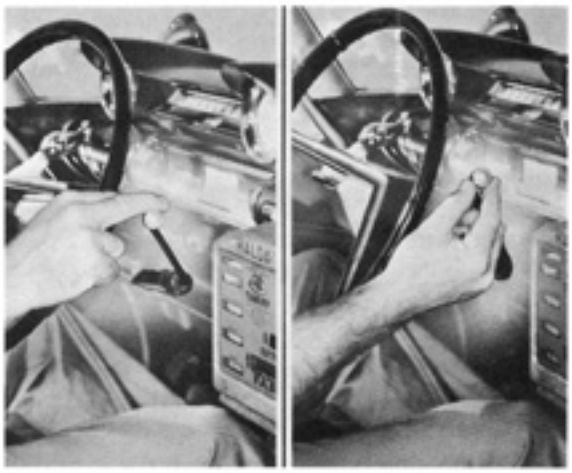


Fig. 11—Test crossover "feel"

The crossover action should be smooth. Eliminate any "lumpy" feeling caused by misalignment of the slots by adjusting the position of the swivel on the second-high control rod—never by changing the setting of the low-reverse control rod swivel.

FINAL LINKAGE ADJUSTMENT CHECKS

After completing all adjustments, jam the gearshift lever into low with considerable force —close to 50 pounds or so, measured at the knob. Then check for any change in crossover "feel". If there's no change, repeat this test in reverse, second and high.

If the crossover "feel" changes on any of these tests, it's a sign that some part in the linkage system is damaged. For example, a shift lever might be slipping where it is staked on its hub. If this happens, replace with a new assembly, or repair by welding. It's also possible that a transmission shift lever may be moving slightly on its shaft. To check this, loosen the nut on the shaft and feel to see if the lever is turning, even the least bit, on the shaft. If it is, install a new lever.

To finish the job, check for binding in the linkage by shifting the transmission through all four gears. Depress the clutch pedal and accelerator pedal fully on each shift. This will tell you if there's interference between the gearshift control linkage and the clutch or accelerator linkages.

BINDING LINKAGE

If the gearshift lever operates stiffly, look for points of interference at the control rods. For example, the low-reverse control rod might be bent out of shape, causing it to rub against the clutch linkage or the car body. You can bend the rod slightly to return it to its original shape and eliminate the interference. But don't overdo it and bend the rod beyond the range of adjustment provided. You'll find it may be necessary to readjust the low-reverse control rod swivel, particularly on the heavy-duty linkage.

After the interference has been eliminated, recheck the crossover "feel". If a crossover adjustment is necessary, make it at the second-high control rod swivel only. And don't overlook the possibility that other parts of the linkage may be damaged or distorted, causing binding.

If more than the slightest effort is required to move the gearshift lever through the crossover from low to second or high, be sure the floor seal isn't rubbing against the shift tube. If the position of the floor seal is okay but the "sticky" crossover persists, it may be caused by a misaligned shift tube upper pivot in the column jacket bell. To correct this, take firm hold of the shift tube about halfway down its length. Then pull or push hard, both left and right, a few times. This sideways back-and-forth movement should spring the pivot back into alignment.

If it's questionable whether the binding is in the linkage or in the transmission, disconnect both control rods from the shift levers at the transmission. Then operate the transmission shift levers, one at a time, by hand. Don't forget to return them both to neutral when you're finished, though. Causes of hard shifting originating inside the transmission are covered later in this Reference Book.

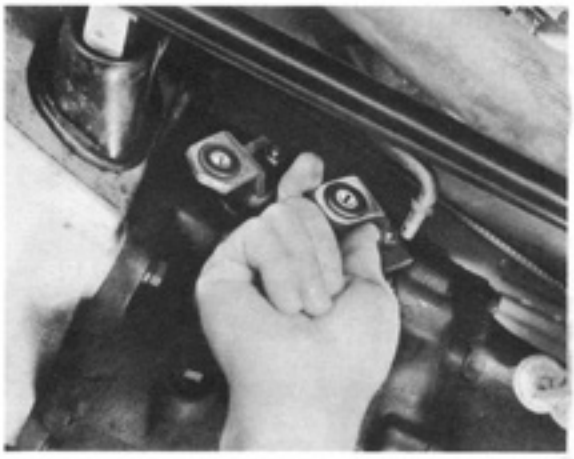


Fig. 12—Test for binding inside transmission

If you suspect that lack of lubrication is the problem, remove the gearshift lever and apply Lubriplate sparingly to its pivot and to the inner end of the lever. Also apply a small amount to the shift tube pivot in the column jacket bell. Work the lubricant into the contact area, then wipe off the excess.

FLOOR-MOUNTED GEARSHIFT LINKAGE ADJUSTMENT

To test the floor-mounted gearshift linkage, just shift through all gear positions. The shift feel should be crisp, with no binding, and the crossover action should be smooth. Also be sure the lever doesn't touch the seat cushion in low or high gears.

If hard shifting is evident, inspect the linkage from underneath the car for bent control rods and other damage that might cause binding. Raise the boot and lubricate the pivot points and yoke selector mechanism of the linkage with engine oil. And if you suspect that the binding might be in the transmission, itself, disconnect both control rods at the transmission and try the transmission shift levers, one at a time.

PRIMARY ADJUSTMENT

If linkage adjustment is needed, raise the boot and slide a wedge between the second-high lever and the gearshift fork to keep the crossover pin engaged in both levers. This effectively locks the two levers together in neutral to maintain the proper crossover alignment while adjustments are being made.

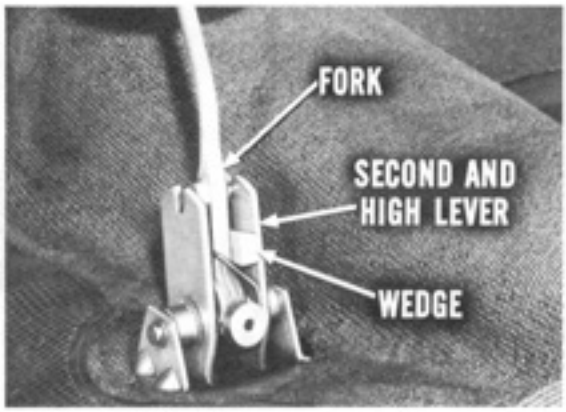


Fig. 13—Wedge keeps crossover pin engaged

From underneath the car, disconnect the control rod swivel from the first-reverse lever. Also loosen the swivel clamp nut on the second-high control rod to allow the two locked levers to move as necessary during adjustment. Be sure neither shift lever at the transmission moves out of the neutral position while you're doing this.

The primary adjustment is made by loosening the locknut on the end of the first-reverse control rod and moving the swivel block back or forth on the rod to position the gearshift lever. You can change the angle of the gearshift lever to suit the individual owner. Just move it to the position desired and adjust the swivel block to line up with the hole in the first-reverse lever. When it's set, coat the swivel block stud with Lubriplate and connect it to the first-reverse lever. Tighten the locknut.

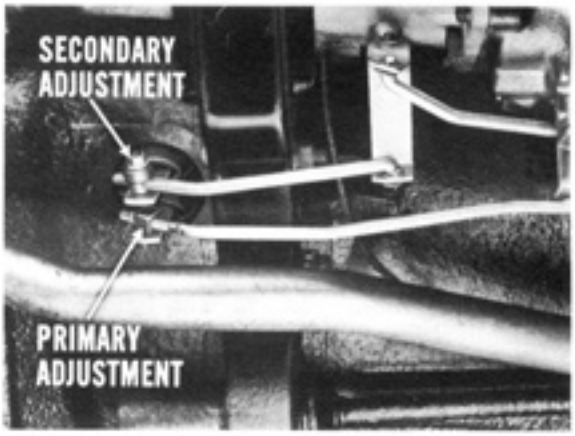


Fig. 14—Control rod adjustment points

SECONDARY ADJUSTMENT

During the primary adjustment, the second-high control rod was free to slide back and forth in its loosened swivel. The secondary adjustment, which establishes the smoothest possible crossover shift action, is made at this swivel. To make this adjustment, slide the second-high control rod back and forth gently through the loosened swivel clamp to find the mid-backlash position of the linkage. Do this very carefully to keep the shift lever at the transmission from moving out of the neutral position. When you've found the right spot, tighten the clamp nut in the swivel to 100 inch-pounds of torque.

Remove the wedge between the second-high lever and the gearshift fork, then shift into either second or high. Measure the clearance between the tip of the crossover pin and the first-reverse lever. The clearance should be no more than .055-inch. If necessary, bend the first-reverse lever slightly to get this dimension.

To test your work, just shift the transmission to all extremes. If it feels right, lower the boot into position.

CLUTCH OPERATION

The transmission is but one part of the entire drive train of the automobile. Another drive-train component, and one which may have a great effect upon the proper operation of the transmission, is the clutch. Hard shifting, clashing gears and popping out of gear are among the transmission complaints which can be traced to a faulty clutch.

CLUTCH PEDAL FREE PLAY ADJUSTMENT

Maximum clutch life and good operation depend on the right amount of clutch pedal free play—the amount of pedal movement before the clutch starts to disengage. On all models, there should be $\frac{5}{32}$-inch free movement of the clutch release fork, measured at its outer end.

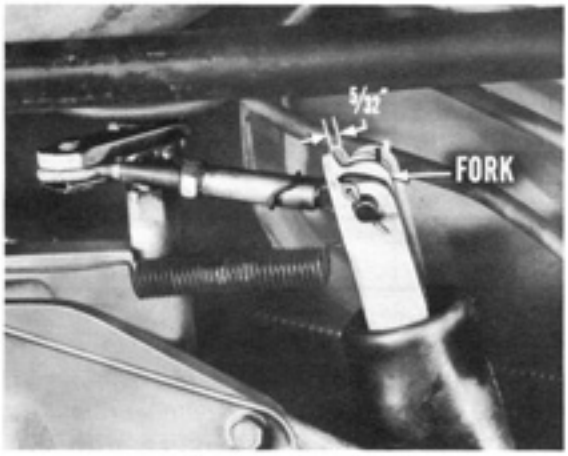


Fig. 15—Clutch free play

This will give you about an inch of free travel of the pedal. However, don't attempt to gauge the amount of free play by measuring the travel of the clutch pedal before it meets resistance. This method is unreliable because the over-center spring makes it impossible to feel the end of the free play accurately. Shorten or lengthen the effective length of the adjusting link to the clutch release fork, as necessary.

CLUTCH CHATTER

Clutch chatter, while not actually a transmission problem, is closely related to it because it affects the quality and "feel" of gearshifting. In addition to a binding pressure plate, clutch disc hub or release levers, glazed or loose clutch facings and misalignment of the transmission, a chattering clutch can also be caused by just the slightest trace of oil on the clutch disc. If you find evidence of oil leaking into the clutch, check the following areas to locate the leak.

At the engine, inspect the oil pan rear gasket, the rear crankshaft seal and retainers, the rear engine oil gallery plug, and the camshaft end plug for oil leaks. In some cases, an oil leak at the rear of the rocker chamber cover may run down to the clutch.

At the transmission, leakage past the drive pinion bearing retainer gasket or seal could flow directly onto the clutch facing.

Don't even overlook a leaking brake master cylinder or an over-lubricated clutch torque shaft. Leakage from either of these points can enter the clutch housing through the clutch release fork boot.

OVERHAUL TIPS

For a step-by-step guide to manual transmission overhaul, follow the procedures presented in your Service Manual. Due to certain detail differences, United States and Canadian transmissions require slightly different overhaul procedures. Don't try to use the Service Manual for one as a guide when working on the other.

And, with cars built in the United States, be sure you know which of the two current transmission models you're working on. The two models are very similar in design features and appearance. The 903 standard manual transmission, referred to as the standard 3-speed synchroshift transmission in the Service Manuals, is standard equipment with all six-cylinder engines and the 318-cubic-inch V-8. The 745 heavy-duty standard manual transmission, referred to as the standard 3-speed heavy-duty transmission in Service Manuals, is standard on the larger V-8's. It's also optional for the smaller V-8 engine as well as Plymouth and Dart six-cylinder engines.

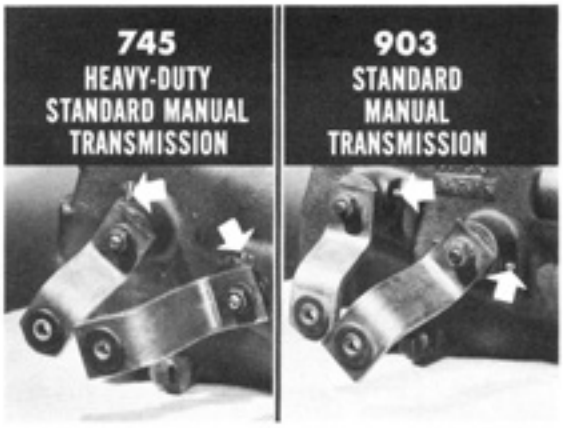


Fig. 16—Retainer pins identify transmission

Here's a sure way to tell these two models apart, even when they're installed in a car. Examine the retainer pins in the two gearshift lever shaft bosses on the left side of the transmission case. These two pins are *horizontal* on the 903 standard manual transmission; they are *vertical* on the 745 heavy-duty standard manual transmission.

PARTS IDENTIFICATION

In the design of the manual transmissions for 1961 Chrysler Corporation cars, every attempt has been made to reduce the possibility of installing the wrong replacement parts. For example, 903 standard manual transmission gears will not mesh with gears from the 745 heavy-duty standard manual transmission—the helical teeth of corresponding gears spiral in different directions. And gears having different numbers of teeth also have different major diameters, thus preventing many mismatched combinations. However, when replacing gears, it is well to positively identify the new gear by counting the gear teeth.

MANUAL TRANSMISSIONS—1961 PASSENGER CARS

	903 Standard Manual Transmission		745 Heavy-Duty Standard Manual Transmission	
	6-Cyl.	318 V-8	6-Cyl.	V-8's
GEAR RATIOS:				
Low	2.71	2.12	3.02	2.55
Second	1.83	1.43	1.76	1.49
Reverse	3.48	2.73	3.95	3.34
NUMBER OF GEAR TEETH:				
Drive Pinion Countershaft	19	22	18	20
Cluster Driven Gear	32	29	33	31

NOTES:

1. Data for the 903 Standard Manual Transmission also pertains to ALL Canadian passenger car transmissions.

2. A few early 1961 six-cylinder cars were equipped with 903 transmissions having gear ratios: Low—2.50, Second—1.68, Reverse—3.20.

INSPECTION AND DIAGNOSIS

In cases where a mis-adjusted gearshift linkage prevented full meshing of gears, inspect for damaged or chipped gear teeth on the low and reverse sliding gear, and mating gears. You can remove small nicks or burrs from gear teeth with a fine stone. For your customer's sake—and the sake of your own reputation—don't replace any more parts than necessary.

If the trouble was a sticking feeling coming *out* of neutral when shifting to another gear, it may have been caused by sharp corners at the neutral detent notches of the transmission shift lever cams. It's a good idea to inspect for this condition whenever the transmission is disassembled.

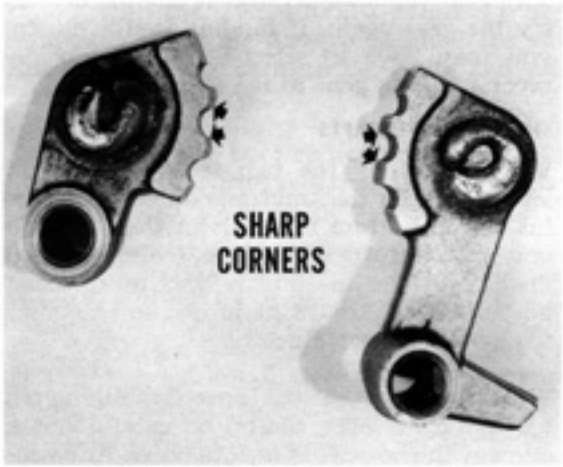


Fig. 17—Stone-off neutral detent notch

Use a fine stone to round off the corners of the neutral detent notch. Be very careful not to round off the corners too much or the shift levers may develop a tendency to slip out of neutral.

LUBRICANT

If you find signs of an oil leak at the center of the mainshaft flange when you remove the parking brake from the transmission extension, determine its source. If the rear seal in the extension housing is okay and the leak is between the front edge of the flange and the mating shoulder on the mainshaft, this leak can usually be corrected by replacing only the flange, and not the mainshaft.

Fig. 18—Seal countershaft bore

Look for signs of a lubricant leak past the countershaft at the front of the transmission case. To prevent leakage, apply a thin even coat of MoPar or Chryco gasket sealer to the inside of the bore for the countershaft in the transmission case during reassembly. Do this just before you drive the countershaft all the way into place. Apply the sealer from the front of the case, not from the inside. And don't let it overflow onto the machined front surface of the case or into the case.

It's essential that the gasket for the drive pinion retainer be selectively fitted as described in your Service Manual. If the gasket used is too thin, lubricant could leak out to the clutch. If it's too thick, the bearing will have end play which it should not have.

When you install the transmission, don't overlubricate the drive pinion shaft pilot bushing. If you do, you'll end up with a slipping or chattering clutch.

ELIMINATE EXCESSIVE END PLAY

Be sure to measure the end play of the second-speed gear and of the cluster gear before you remove them. That way, you'll know if you're going to need a new snap ring or new thrust washers when you reassemble the transmission. It is necessary to eliminate all end play of the synchronizer clutch gear by installing the thickest snap ring that can be used. This will prevent excessive end play of the second-speed gear. In fact, all the end play specifications in your Service Manual should be strictly maintained for proper transmission operation.

When you install the countershaft, make sure the tabs on the thrust washers are positioned properly in the case grooves.

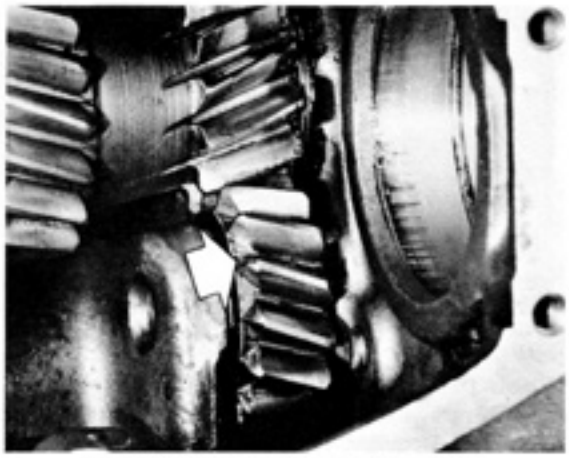


Fig. 19—Reverse idler properly installed

Be sure to get the reverse idler gear installed properly—it's easy to put this in backwards if you're not careful.

For Canadian cars only, there is a new reverse idler gear available as part of a package which also includes a low and reverse sliding gear and a countershaft cluster gear. These new gears, which are currently being used in Canadian production, have chamfered tooth ends in the areas where the gears first contact each other. This gear package can be installed to correct difficulties in shifting to low or reverse due to "butt-ending" of the gear teeth when the car is at rest.

FIT OF LOW-REVERSE SLIDING GEAR

When you place the low and reverse sliding gear on the mainshaft, slide it the full length of the splines a few times to be sure there is absolutely no binding. On the 745 heavy-duty standard manual transmission, this is especially important if the service complaint is a condition of "hanging up" in low gear. If you find any binding, no matter how slight, try removing the gear and rotating it one spline, before you put it back on. If necessary, continue to change the mating of the splines until you find a smooth-sliding combination.

If the gear still binds, polish down the major diameter of the mainshaft splines with fine

Fig. 20—Test reverse sliding gear

abrasive cloth. Then clean it thoroughly and try the gear again. If binding is still present, you may have to select-fit a new low and reverse sliding gear to the mainshaft.

SHIFT LEVER SHAFTS

When installing the two seals for the shift lever shafts in the transmission case, be careful not to bottom the seals in their bores or you will distort them. The seals should fit flush with the machined faces of the shaft bosses. Be sure to use the proper seal installing tools to insure this flush fit.

When you drive out the tapered retaining pins for the shift lever shafts, be careful not to damage the bosses or crack the case. And when you install these pins, drive them in firmly but not too tight. If you bend or mushroom a pin, you won't be very well liked by the next man who has to disassemble the transmission!

CLUTCH HOUSING BORE AND FACE RUNOUT

If the transmission is not correctly aligned with the crankshaft centerline, clashing of gears when shifting into low or reverse and popping out of gear will result. Premature wear of the drive pinion pilot bushing in the end of the crankshaft and of the pilot bearing in the end of the pinion shaft, as well as breakage of clutch disc damper springs, are other possibilities.

Alignment of the transmission is determined by measuring the clutch housing bore and face

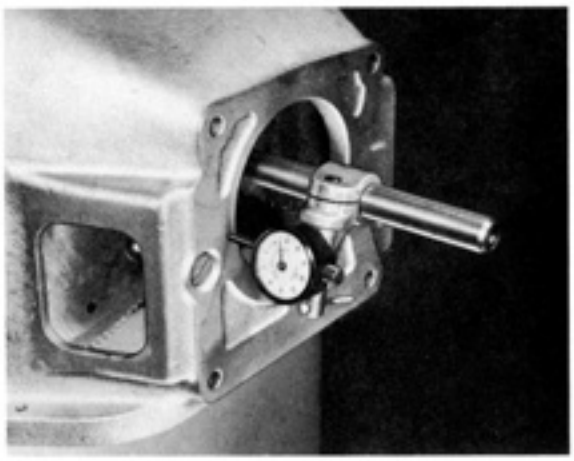


Fig. 21—Measure clutch housing bore and face runout

runout with the special tool C-870 and a dial indicator. See your Service Manual for the full story on the permissible limits and adjustment procedures.

Correct excessive bore runout by installing a pair of offset housing alignment dowels. Excessive face runout should be corrected by installing shims between the clutch housing and the engine only. When finishing this job, be sure to tighten the clutch housing bolts to the specified torque values.

A FINAL CAUTION

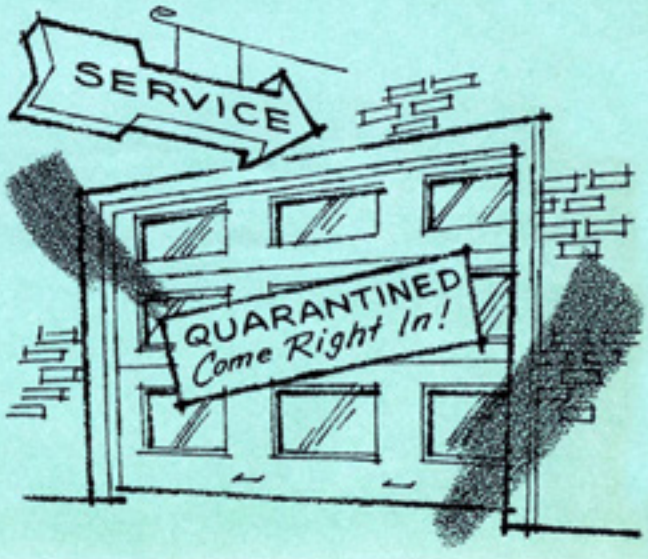
Before you install any manual transmission, be sure you have the right one for the engine and car you're servicing. One way to verify this is to check the gear ratios stamped in the transmission cover plate against those in the chart on page 10. It's possible, for example, to install a V-8 903 standard manual transmission in a six-cylinder Plymouth or Dart. However, the different gear ratios of the V-8 transmission would surely lead to a complaint of sluggish performance in low and second gears.

A wrong gear ratio combination leads to an even greater problem. The lower numerical gear ratios of the V-8 transmission put an added starting load on the clutch. This could lead to early failure of the clutch discs. So you can see how important it is to install the correct transmission.

A Parting Thought

Remember—your customers bring their service problems to you because they know you have the equipment, parts and "know-how" to take good care of their cars. Your sincere desire to be of service to your customers is the starting point for a chain reaction that creates satisfied customers and a successful dealership. So use the information in this Reference Book to help you keep your service customers happy with their "stick-shift" jobs.

CUSTOMER SATISFACTION CAN BE CONTAGIOUS, AND THIS IS ONE EPIDEMIC WE WANT TO SPREAD!



SERVICE REFERENCE BOOK

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Litho in U.S.A.